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ABSTRACT

Some nonmetropolitan counties, largely in the southern United States, remained severely economically depressed during the 1970's despite nonmetro America's economic gains during the period; other severely economically depressed counties improved their incomes in the 1970's. This report builds on an earlier study which identified 298 persistently low-income nonmetro counties during 1950-1970 and uses discriminant analysis to examine what happened to those counties during 1975 and 1979. The 231 counties which retained low-income status had higher rates of work disabilities, larger nonwhite populations, more female-headed families, fewer high school graduates, fewer workers, depended heavily on transfer payments for income, and had a poverty rate much above the nonmetro average. Twenty-seven counties escaped low-income status during 1975 and 1979 primarily through nonfarm industries such as services, manufacturing, and mining. Despite falling farm incomes 11 counties escaped low-income status in 1979 because they were predominately retirement or college counties or adjacent to urban areas. Tables present demographic and economic characteristics of nonmetro and low-income counties. Appendices containing tables compare southern low-income counties with other southern counties and describe use of discriminate analysis. (LFL)

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United States Department of Agriculture

Economic Research Service

Rural Development Research Report Number 50

Economic Structure and Change in Persistently Low-Income Nonmetro Counties

Robert A. Hoppe

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Economic Structure and Change in Persistently Low-Income Nonmetro Counties. By Robert A. Hoppe, Agriculture and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Rural Development Research Report No. 50.

Abstract

Some nonmetro areas, largely in the South, remained as severely depressed during the seventies as they had been for decades, despite nonmetro America's general economic gains during the period. These counties differed from other nonmetro counties in location, population characteristics, economic structure, and farm structure. However, some severely depressed counties improved their incomes in the seventies, primarily through nonfarm industries such as services and manufacturing. Mining also provided a large share of the growth in some of the counties with the largest income improvements. Farming helped some counties, but farm income has been too erratic recently to be reliable. Nothing guarantees a county's escape from low-income status; some of those that escaped earlier in the decade returned to low-income status by 1979.

Keywords: Economic growth, low-income areas, nonmetro income, per capita income, poverty, rural poverty

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Glossary

College counties. Counties that contain a senior State college.

Disabled. Noninstitutional population between 16 and 64 years that reported a work disability. A disability is a physical or mental health condition lasting as least 6 months that limits the kind and amount of work one can perform. An area's disabled population is measured by the proportion of the people between 16 and 64 years old reporting a work disability.

Earnings (earned income). The sum of wages and salaries, other labor income, and proprietors' income.

Elderly. Anyone 65 years old or older.

Employed. Employed workers at least 16 years old. An area's employed population is measured by employed workers at least 16 years old as a percentage of the total population.

1975 escapees. Persistently low-income counties that escaped their low per capita income status in 1975 but returned to it in 1979.

1979 escapees. Persistently low-income counties that retained their low per capita income status in 1975 but shed it in 1979.

High school graduates. Population 25 years old or older that graduated from high school. An area's high school graduates are measured as the percentage of the population at least 25 years old that graduated from high school.

Income relative. An area's per capita personal income as a percentage of the U.S. average. An area's income relative is calculated by dividing its per capita personal income by the national per capita income.

Lost persistently low-income (LPLI) status counties. Persistently low-income counties that lost their low per capita income status in both 1975 and 1979.

Low-income status. Counties are low-income in a given year if they are in the bottom fifth when ranked by per capita personal income.

Metropolitan (metro) areas. Counties that are part of a Standard Metropolitan Statistical Area. (See Standard Metropolitan Statistical Area.)

Nonmetropolitan (nonmetro) areas. Counties that are not part of a Standard Metropolitan Statistical Area. (See Standard Metropolitan Statistical Area.)

Nonwhite population. Blacks, Indians, Eskimos, Aleuts, Asians, Pacific Islanders, and members of other nonwhite races not elsewhere classified.

Other labor income. Largely employer contributions to private pension and welfare funds.

Persistently low-income (PLI) counties. Counties with low per capita income in 1950, 1959, and 1969.

Personal income. Total income individuals receive from wages and salaries, other labor income, proprietors' income, property income, and transfer payments.

Poverty rate. Percentage of the population that is poor. Poverty status was determined by comparing 1979 income to an income cutoff that varies with family size and composition. For example, a family of four with two children was poor if its income was below $7,356. Both the count of the poor and the count of the population exclude inmates of institutions, members of the Armed Forces in barracks, college students in dormitories, and unrelated individuals less than 15 years old.

Property income. Dividends, interest, and rent.

Proprietors' income. Self-employment income of sole proprietors and partners.

Retirement counties. Counties with net inmigration of whites 60 years old or older of at least 10 percent between 1960 and 1970.

Rural. See urban.

Services. Transportation, communications, public utilities, wholesale and retail trade, finance, insurance, real estate, business services, personal services, and agricultural services.

Spanish population. People of Spanish origin, as determined by a self-identification question on the 1980 Census questionnaire. May be of any race, white or nonwhite.

Standard Metropolitan Statistical Area (SMSA). A county or group of counties containing at least one central city with a population of 50,000 or more, or a central city with a population of at least 25,000 if the city's population plus the population of contiguous, thickly populated places equals 50,000 or more. Additional contiguous counties are

considered part of an SMSA if they are economically and socially integrated with the central city.

Still persistently low-income (SPLI) counties. Persistently low-income counties that retained their low per capita income status in both 1975 and 1979.

Transfer payments. Payments for which no work was done in the current time period. Transfers are largely from government programs, such as Social Security, Unemployment Compensation, Medicare, and public assistance (welfare).

Urban. The urban population lives in urbanized areas or in places with populations of 2,500 or more outside urbanized areas. (See urbanized area.) The remaining population is rural. Metro is not synonymous with urban, and nonmetro is not synonymous with rural. (See metro, nonmetro, and SMSA.) One can be both nonmetro and urban. For example, a person living in a city of 2,500 inhabitants or more in a county outside an SMSA is both nonmetro and urban. Similarly, a person living on the fringes of an SMSA in the open country or in a small city with less than 2,500 inhabitants is both metro and rural.

Urbanized area. An area that has a total population of at least 50,000 and a population density of at least 1,000 per square mile. An urbanized area generally consists of a central city and its surrounding, densely settled suburbs. Urbanized and metro are not synonymous. Not all parts of all metropolitan counties are densely populated enough to be classified as urbanized.

Summary

Some nonmetro areas, largely in the South, remained as severely depressed during the seventies as they had been for decades, despite nonmetro America's economic gains during the period. These counties differed from other nonmetro counties in location, population characteristics, economic structure, and farm structure.

However, some severely depressed counties improved their incomes in the seventies, primarily through nonfarm industries such as services and manufacturing. Mining also provided a large share of the growth in some of the counties with the largest income improvements. Farming helped some counties, but farm income has been too erratic recently to be reliable. Nothing guarantees a county's escape from low income; some of those that escaped earlier in the decade returned to low-income status by 1979.

This report builds on an earlier study that identified 298 nonmetro counties that had low incomes in 1950, 1959, and 1969, and examines what happened to those persistently low-income (PLI) counties in the seventies. This study divides the original 298 PLI counties into four classifications:

- **Still persistently low-income (SPLI) counties.** The 231 PLI counties that retained their low-income status in both 1975 and 1979.
- **Lost persistently low-income (LPLI) status counties.** PLI counties that lost their low-income status in both 1975 and 1979.
- **1975 escapees.** PLI counties that lost their low-income status in 1975 but returned to it in 1979.
- **1979 escapees.** PLI counties that retained their low-income status in 1975 but lost it in 1979.

SPLI counties differed markedly from all nonmetro counties in location, population characteristics, economic structure, and farm structure. All except 18 of the counties were located in the South. SPLI counties had higher rates of work-limiting disabilities, larger nonwhite populations, more female-headed families with no husband present, fewer high school graduates, and fewer workers. The SPLI group depended heavily on transfer payments (such as Social Security and Unemployment Compensation) for income and had a poverty rate much above the nonmetro average. Almost 30 percent of the SPLI population lived in poverty. Farms tended to be small in the SPLI group, with acreages averaging slightly over half the nonmetro average.

The remaining 67 counties lost their low-income status in 1975, in 1979, or in both 1975 and 1979. Most of the economic growth that enabled these counties to lose their low-income status came from nonfarm sources. However, economic growth alone is not a panacea for all of a low-income county's problems. Personal income in a county may grow rapidly but not be evenly distributed. In such a county, groups of people could remain in poverty, in spite of impressive income growth. For example, three LPLI counties had white poverty rates less than 10 percent and black poverty rates above 30 percent. LPLI counties still had high disability rates and low educational and employment levels.

In addition, loss of low-income status is not necessarily permanent. The 1975 escapees returned to low-income status in 1979, in part because of falling farm income. And, LPLI counties that lost their low-income status because of a revival of the coal mining industry may regain it during recessions severe enough to reduce the demand for coal.

Economic Structure and Change in Persistently Low-Income Nonmetro Counties

by Robert A. Hoppe*

Introduction

Some nonmetro areas remained as severely depressed during the seventies as they had been for decades, despite economic growth and development in rural America during the period. Other depressed areas improved their incomes. Davis ranked nonmetropolitan counties by per capita personal income in 1950, 1959, and 1969 (*3*).[1,2] He identified 298 nonmetropolitan counties that ranked in the lowest per capita income quintile in all 3 years, and analyzed economic changes in these persistently low-income (PLI) counties between 1969 and 1975. He found that improved earnings from mining and farming helped some counties escape the bottom quintile by 1975. This report builds on the Davis study by examining changes in his PLI counties throughout the seventies. Understanding economic growth in these counties may contribute to developing more effective policies for low-income rural areas.

County Classification and Methodology

This report divides Davis' original 298 PLI counties into the following four low-income groups based on their 1975 and 1979 per capita income ranks:

Classification	Ranked in bottom quintile in:			Number of counties
	1950, 1959, 1969	1975	1979	
SPLI (still PLI)	Yes	Yes	Yes	231
LPLI (lost PLI status)	Yes	No	No	27
1975 escapees	Yes	No	Yes	11
1979 escapees	Yes	Yes	No	29
Total	NA	NA	NA	298

NA = Not applicable.

Using 2 nonconsecutive years helps distinguish between counties with fluctuating income and counties with truly improving income. Both 1969 and 1979 were near the peak of a business cycle (*17*). During 1975, however, the economy contracted for the first quarter of the year and expanded for the last three quarters. Using years from different parts of business cycles allows us to see how low-income counties performed relative to other counties under differing business conditions.

An original PLI county was classified as a still persistently low-income (SPLI) county if it remained in the bottom quintile in both 1975 and 1979. Of the 298 original PLI counties, 231 were SPLI counties.

A county was deemed to have lost its persistently low-income (LPLI) status if it escaped the bottom quintile in both 1975 and 1979. Only 27 of the original PLI counties lost their low-income status during the seventies.

The remaining original PLI counties were more difficult to classify. Twenty-nine counties (labeled 1979 escapees) ranked in the bottom quintile in 1975 but not 1979; 11 counties (designated 1975 escapees) ranked in the bottom quintile in 1979 but not 1975.

The classification deals with counties that left or remained in the bottom income quintile after a prolonged stay. If

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[1]Italicized numbers in parentheses refer to references in the bibliography at the end of the report.

[2]This study classified a county as nonmetropolitan if it was outside a Standard Metropolitan Statistical Area (SMSA), as defined in the 1974 Office of Management and Budget designations. For a more exact definition, see "Standard Metropolitan Statistical Area" in the glossary or (*22*). Because Davis (*3*) used the 1974 SMSA designations when selecting the original persistently low-income counties, this report also used the 1974 designations rather than the more current Metropolitan Statistical Areas (*21*).

Data Sources

Much of the county data used in this report comes from the Bureau of Economic Analysis (BEA), U.S. Department of Commerce. BEA annually estimates employment and personal income in each county (*18, 19*). Personal income consists of wages and salaries, other labor income, proprietors' income, property income, and transfer payments. For more information about BEA's income and employment data, see (*20*). For definitions of various sources of income, see *(20)* or the glossary.

Wages and salaries, other labor income, and proprietors' income together make up earnings. Earnings are largely estimated by place of work and are assigned to the county where workers work, not where they live (*20*). BEA provides computer tapes with estimates of earnings by industry (such as farming and mining) and by type (wages and salaries, other labor income, and proprietors' income) for each county. BEA also estimates employment by place of work.

Personal income for each county is derived from total earnings by place of work. Earnings are adjusted to reflect commuting after personal contributions for social insurance (PCSI), such as Social Security, are subtracted from them. The commuting adjustment converts earnings from a place-of-work basis to a place-of-residence basis. Finally, transfer payments and property income are added to adjusted earnings to get personal income by place of residence. No adjustments to transfers or property income are necessary, for both are estimated by place of residence.

Thus, an estimate of earnings adjusted for both PCSI and commuting was available only for total earnings. In this report, estimates of earnings by type and by industry are restricted to earnings before the commuting and PCSI adjustments. When total earnings are compared to transfer and property income, however, earnings are adjusted for commuting and PCSI. The adjustments put earnings, transfers, and property income on the same measurement basis and allow them to sum to total personal income.

In addition to using BEA data, this report draws heavily from the censuses of population and agriculture (*14, 15*). The most current demographic data available are from the 1980 Census of Population. The income data from the census are for 1979, the year before the census was conducted. Therefore, 1979 BEA income and employment data are also used rather than data from a later year. Similarly, data from the 1978 Census of Agriculture, the agricultural census closest to 1979, are used.

some counties left the bottom quintile, others have entered. This report says nothing about these new entrants; it only examines the chronically low-income counties and attempts to show how some of them managed to improve their income relative to other counties.

The remainder of this report is divided into two parts. The first part compares the SPLI counties with all nonmetro counties; the second part shows how some low-income counties improved their income status during the seventies.

SPLI Counties Versus Nonmetro Counties

Focusing on the SPLI counties helps us understand how low-income areas differ from other nonmetro areas. The SPLI counties differ markedly from all nonmetro counties in location, population characteristics, economic structure, and farm structure. Data for the other low-income groups are included in the tables for readers interested in making their own comparisons. Much of the other groups' data is also discussed later in the report.

Location

All except 18 SPLI counties were located in the South (fig. 1). Four Southern States—Georgia, Kentucky, Mississippi, and Tennessee—each had more than 20 SPLI counties (table 1).[3]

Population Characteristics

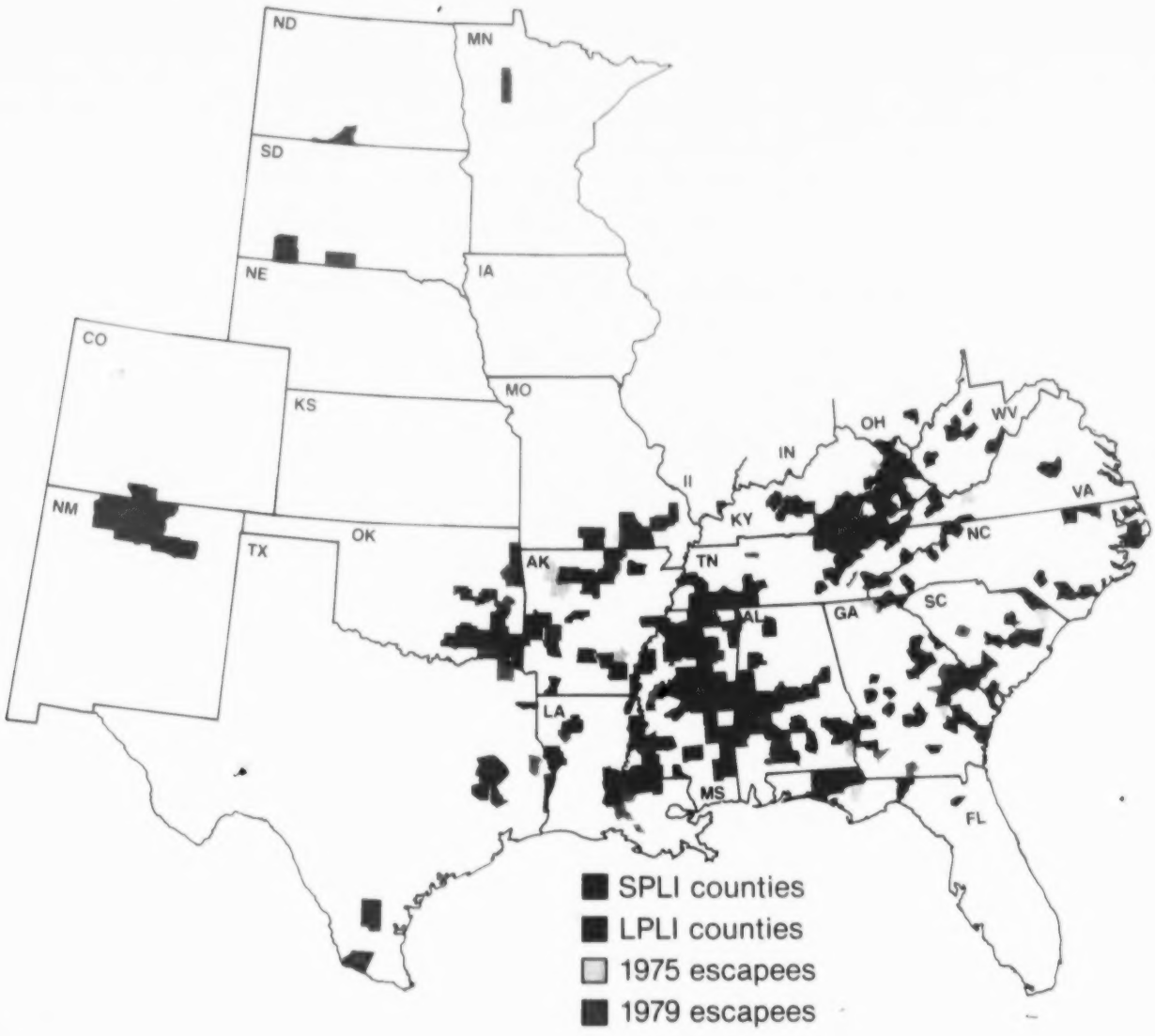
Over 3.5 million people, or about 6 percent of the nonmetro population, lived in SPLI counties in 1980. Nonwhites made up a much larger share of the population in

[3]One may wonder if southern SPLI counties were only marginally different from other nonmetro southern counties. In most respects, however, the characteristics of other nonmetro southern counties were much closer to those for all nonmetro counties than to those for southern SPLI counties. Appendix A compares selected characteristics of southern SPLI and other nonmetro southern counties.

the SPLI group than in nonmetro counties as a whole (table 2). However, the racial composition of the population among the SPLI counties varied widely. Of the 231 SPLI counties, 93 were over 90 percent white in 1980 and 48 were over 50 percent black. Indians accounted for 65 percent of the population in Sioux County, ND; 78 percent in Todd County, SD; and 93 percent in Shannon County, SD. People of Spanish origin made up 80 percent of the population in the six SPLI counties near the Rio Grande in Colorado, New Mexico, and Texas. Almost all SPLI counties were either southern highland counties with largely white populations or counties with sizable black, Indian, or Spanish populations.

The SPLI population per county was about 10,000 less than the 25,500 nonmetro average (table 2). This resulted from small county size rather than low population density, for the SPLI population density actually exceeded the

Figure 1
Persistently low-income counties are mainly in the South



nonmetro average.[4] A few SPLI counties had extremely low population densities. For example, all eight of the SPLI counties in the Northern and Western States of Minnesota, the Dakotas, Colorado, and New Mexico had fewer than 10 people per square mile. Rural people represented over 80 percent of the population in the SPLI group, with 125 of the 231 SPLI counties being entirely rural (table 2).[5]

People in SPLI counties were more likely to report a work-limiting health disability than the nonmetro population in general (table 2). The highest disability incidence was in Searcy County, AR, where 22.3 percent of the population between 16 and 64 years of age reported a work-limiting disability. Ten other SPLI counties also had disability incidences of at least 20 percent.

Table 1—Geographic distribution of low-income nonmetro counties

Region and State	SPLI counties	LPLI counties	1975 escapees	1979 escapees
		Number		
United States	231	27	11	29
Northeast	0	0	0	0
Midwest	14	0	1	0
East North Central	2	0	1	0
Illinois	1	0	1	0
Ohio	1	0	0	0
West North Central	12	0	0	0
Minnesota	1	0	0	0
Missouri	8	0	0	0
North Dakota	1	0	0	0
South Dakota	2	0	0	0
South	213	27	10	29
South Atlantic	62	9	5	6
Florida	5	1	1	0
Georgia	25	5	2	5
North Carolina	14	0	0	0
South Carolina	8	1	1	1
Virginia	4	2	1	0
West Virginia	6	0	0	0
East South Central	117	10	2	11
Alabama	17	1	1	2
Kentucky	33	7	1	1
Mississippi	40	2	0	5
Tennessee	27	0	0	3
West South Central	34	8	3	12
Arkansas	10	5	3	3
Louisiana	9	0	0	4
Oklahoma	10	0	0	3
Texas	5	3	0	2
West	4	0	0	0
Mountain	4	0	0	0
Colorado	1	0	0	0
New Mexico	3	0	0	0

Source: (*19*).

The elderly made up about the same percentage of the population in the SPLI group as in all nonmetro counties (table 2). The percentage of adults at least 25 years old who graduated from high school was substantially less in the SPLI group than in all nonmetro counties.

The SPLI poverty rate was almost double the nonmetro average (table 2). Almost 30 percent of the SPLI population lived in poverty. Two SPLI counties—Starr, TX, and Tunica, MS—each had poverty rates above 50 percent; they were the poorest counties in the Nation in 1979. Another 21 SPLI counties had poverty rates of at least 40 percent. The rate for SPLI blacks was particularly high, double the rate for SPLI whites, triple the rate for the total nonmetro population, and 9 percentage points higher than the rate for the total nonmetro black population.

People in families with a female head of household and no husband present have one of the highest poverty rates in the Nation (*16*). Concentrations of these female-headed families partially explain the low-income status of individual counties. The SPLI group had a higher incidence of these families than all nonmetro counties (table 2). Two-thirds of the SPLI counties had a greater percentage of female-headed families than the 10.9 percent nonmetro average.

Employed workers at least 16 years old expressed as a percentage of total population is a dependent population measure. The percentage employed varies inversely with the number of dependents. When the percentage employed is small, the population that must depend on the earnings of others tends to be large. These dependents include children, many elderly, the disabled, and the unemployed. Only one-third of the SPLI population worked, compared with two-fifths of the total nonmetro population (table 2).

Retirees, colleges, and proximity to an SMSA can contribute to economic well-being (*1*). Retirees receive Social Security and other pensions, students bring money from home, and local people can commute to a nearby SMSA to work. A smaller share of the SPLI counties was classified as college counties or adjacent to an SMSA than the nonmetro average. A slightly larger share of the SPLI counties, however, was classified as retirement counties.

[4]Excluding Alaska increases the nonmetro population density to 25.3 people per square mile. After this adjustment, the SPLI group's density about equals the nonmetro average.

[5]Urban people live in urbanized areas or in places with populations of 2,500 or more outside urbanized areas. (*13*). (Urbanized areas have total populations of 50,000 or more and population densities of at least 1,000 per square mile.) The remaining population is rural. One can simultaneously be both nonmetro and urban. People living in a city of 2,500 inhabitants or more in a county outside an SMSA are both nonmetro and urban.

Economic Structure

Earned income, or earnings, formed a smaller share of total personal income in 1969, 1975, and 1979 in the SPLI group than in nonmetro counties in general (table 3). The same was true for property income from dividends, interest, and rent. Transfer payments were a larger portion of personal income in the SPLI group. However, this does not mean that per capita transfers were higher in the SPLI group. The 1979 per capita transfer payment in the SPLI group was $1,074, slightly less than the $1,106 nonmetro average. In low-income areas, even a small transfer payment can be a large share of total income.

Public assistance formed a relatively small portion of SPLI transfer payments. It comprised 20 percent of total transfers in SPLI counties, while retirement programs, including Social Security, made up 59 percent. Never-

Table 2—Selected population characteristics of low-income and all nonmetro counties

Item[1]	Unit	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
Counties	Number	231	27	11	29	2,469
1970 population	Thousands	3,106	483	130	413	54,424
1980 population	do.	3,524	581	148	487	63,002
Population growth	Percent	13.5	20.3	13.8	17.9	15.8
Nonwhite (1980)	do.	27.9	16.8	24.4	26.6	11.8
Black	do.	25.1	15.4	23.9	24.0	8.7
Indian	do.	1.7	.7	.3	2.3	1.2
Other	do.	1.1	.7	.2	.3	1.9
Spanish (1980)	do.	3.2	1.3	.7	.9	3.3
Population per county (1980)	Number	15,257	21,512	13,447	16,804	25,517
Population per square mile (1980)	do.	25.7	38.7	28.6	30.6	20.7
Rural (1980)	Percent	83.1	71.6	81.1	75.8	59.6
Disabled (1980)	do.	14.4	14.7	14.8	13.1	10.0
Elderly (1980)	do.	13.1	12.4	13.9	13.4	12.8
High school graduates (1980)	do.	42.2	44.9	44.0	45.5	59.6
Poverty rate (1979)						
Total	do.	28.5	23.0	23.7	23.5	15.2
White	do.	22.0	19.6	17.9	17.1	12.5
Black	do.	47.2	40.6	42.7	42.9	38.4
Female-headed families (1980)	do.	14.2	12.3	13.5	13.4	10.9
Employed population (1980)	do.	33.3	33.5	35.3	36.0	39.6
Counties classified as						
Retirement	do.	16.0	7.4	9.1	24.1	14.6
College	do.	2.2	7.4	0.0	10.3	7.2
Adjacent to SMSA	do.	31.2	37.0	18.2	55.2	39.2

[1]See the glossary for definitions of terms. More detailed definitions of demographic terms, such as nonwhite, Spanish, and rural, can be found in (*13*). More detailed explanations of retirement and college counties can be found in (*1*).

Source: (*15*).

theless, public assistance was a much larger share of total transfer payments in the SPLI group than in all nonmetro counties. Only 9 percent of all nonmetro transfers, or less than 50 percent of the percentage in the SPLI group, came from public assistance, and about 70 percent came from retirement programs.

The composition of income changed over time in the SPLI group (table 3). Property's share of total income grew gradually in the group, following the nonmetro trend. Transfer payments' share of SPLI income, however, peaked in 1975, which contained the trough, or low point, of a business cycle. By 1979, when the Nation was near the peak of a business cycle, transfers still provided a larger share of income than in 1969, another business cycle peak. Earnings' share of income was lowest in the SPLI group in 1975 and did not return to its 1969 level by 1979.

Wage and salary jobs made up an increasing share of the SPLI group's employment during the decade (table 3). Wages and salaries' share of earnings, however, peaked in 1975. Although farm proprietors' share of employment declined, farming continued to provide a larger proportion of employment and earnings in the SPLI group than in nonmetro areas in general. Earnings per farmer, however, were low. Only 40 of the 231 SPLI counties had earnings

Table 3—Selected sources of personal income, employment, and earnings in low-income and all nonmetro counties

Source	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Percent[1]		
Personal income:					
1969—					
Transfer payments	16.6	16.4	16.2	15.8	11.3
Property income	9.4	9.7	9.6	10.5	12.9
Earnings[2]	74.0	73.9	75.1	73.7	75.9
Total	100.0	100.0	100.0	100.0	100.0
1975—					
Transfer payments	24.1	20.1	20.7	21.9	16.6
Property income	10.5	10.1	10.4	11.7	14.0
Earnings[2]	65.4	69.8	68.8	66.3	69.4
Total	100.0	100.0	100.0	100.0	100.0
1979—					
Transfer payments	21.6	19.1	20.8	18.1	15.3
Property income	11.0	10.8	11.7	12.2	14.8
Earnings[2]	67.4	70.1	67.5	69.7	69.9
Total	100.0	100.0	100.0	100.0	100.0
Employment:					
1969—					
Wage and salary jobs	69.4	77.9	72.2	72.0	80.3
Farm proprietors	22.3	13.8	18.9	19.1	11.4
Nonfarm proprietors	8.3	8.3	8.8	8.9	8.3
Total	100.0	100.0	100.0	100.0	100.0
1975—					
Wage and salary jobs	73.1	82.1	74.9	75.4	82.3
Farm proprietors	18.4	10.4	16.4	15.8	9.5
Nonfarm proprietors	8.5	7.5	8.7	8.8	8.2
Total	100.0	100.0	100.0	100.0	100.0
1979—					
Wage and salary jobs	75.1	83.2	75.3	79.2	83.5
Farm proprietors	15.8	8.8	15.1	12.4	8.0
Nonfarm proprietors	9.1	8.0	9.5	8.4	8.6
Total	100.0	100.0	100.0	100.0	100.0

See footnotes at end of table.

Continued—

per farm proprietor greater than the nonmetro average in 1979. Of the 40 counties, 14 were in Mississippi and another 8 were in Georgia.

The source of earnings by industry in the SPLI group did not change dramatically (table 4). Services comprised about one-third of earnings in each year; manufacturing, about one-quarter; and government, about one-fifth. The SPLI group generally had more earnings from farming than nonmetro counties in general, although the percentage from farming in the group fell after 1969.

Farm Characteristics

Farms tended to be small in the SPLI group, with an average acreage slightly over half as large as the nonmetro average (table 5). This small farm size is reflected in the small percentage of the group's farm operators who reported farming as their principal occupation. Operators of small farms may choose to combine farm with off-farm work.

Average farm size among the SPLI counties varied widely, ranging from 52 acres in Graham County, NC, to 7,761

Table 3—Selected sources of personal income, employment, and earnings in low-income and all nonmetro counties—continued

Source	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Percent [1]		
Earnings:[3]					
1969—					
Wages and salaries	70.8	76.9	68.4	70.4	76.1
Other labor income	3.7	5.5	3.6	3.7	4.3
Farm proprietors' income	13.2	6.6	15.9	12.8	8.9
Nonfarm proprietors' income	12.2	10.9	12.1	13.0	10.7
Total	100.0	100.0	100.0	100.0	100.0
1975—					
Wages and salaries	73.0	75.9	65.1	74.2	76.3
Other labor income	6.0	8.6	5.1	5.8	6.3
Farm proprietors' income	9.9	5.8	20.9	9.1	8.8
Nonfarm proprietors' income	11.2	9.7	8.9	10.8	8.5
Total	100.0	100.0	100.0	100.0	100.0
1979—					
Wages and salaries	71.7	76.6	69.2	73.7	77.0
Other labor income	7.2	10.5	7.1	6.7	7.9
Farm proprietors' income	10.7	6.0	13.8	10.9	6.9
Nonfarm proprietors' income	10.3	6.9	9.9	8.7	8.3
Total	100.0	100.0	100.0	100.0	100.0

[1]Totals may not add due to rounding.
[2]Adjusted for commuting and personal contributions to social insurance.
[3]Not adjusted for commuting and personal contributions to social insurance.

Sources: (*18, 19*).

acres in Shannon County, SD. Only 31 of the SPLI counties, however, had an average farm size greater than the 508-acre nonmetro average.

Sales per farm in the SPLI group were about half the nonmetro average (table 5), although sales varied within the group. Of the 231 SPLI counties, 38 had sales per farm that exceeded the nonmetro average. Sales per farm in the SPLI group were highest in Sharkey County, MS, where they reached $228,300. Sharkey County, located in the Mississippi Delta, also had $32,605 in earnings per farm proprietor in 1979, more than three times the nonmetro average.

Why did Sharkey County remain poor with such high average earnings per farm proprietor? Because prosperous farmers were only a small proportion of the total working population. Of the 2,258 employed people reported in the county in the 1980 Census of Population, only 174, or 7.7 percent, were farm operators or managers (*12*). Lower paid farmworkers and related occupations were much more common, making up 17.1 percent of all workers. Racial disparities also existed in the county. Of farm operators and managers, 93.7 percent were white, but 81.1 percent of farmworkers and workers in related occupations were black. Blacks also had a much higher unemployment rate, 11.8 percent compared with only 2.3 percent for whites. The poverty rate was 44 percent for the county, 55.7 percent for blacks, and 21.6 percent for whites.

Woodlands were a much larger share of farmland in the SPLI group than in all nonmetro counties (table 5). This suggests that a large portion of land in the SPLI group may not be well suited for agriculture. Woodlands were less than 20 percent of farmland in only 37 SPLI counties, 13 of which were in Colorado, New Mexico, North Dakota, Oklahoma, South Dakota, and Texas. These western counties had little harvested cropland; most of their farmland was used for pastureland or grazing. Another 12

Table 4—Source of earnings by major industry in low-income and all nonmetro counties[1]

Year and major industry	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Percent[2]		
1969:					
Farming	16.7	8.2	19.8	15.8	10.9
Mining	2.1	12.9	.5	1.7	2.7
Construction	5.3	5.8	4.0	5.1	5.9
Manufacturing	24.1	18.6	26.6	25.3	26.9
Services	32.2	33.7	31.4	32.9	35.6
Government	19.6	20.8	17.7	19.2	18.0
Total	100.0	100.0	100.0	100.0	100.0
1975:					
Farming	12.7	6.7	23.6	11.7	10.7
Mining	4.3	24.4	.7	2.3	3.9
Construction	4.8	5.0	5.7	7.1	6.0
Manufacturing	23.3	15.3	24.1	25.5	24.2
Services	33.4	29.3	27.9	33.0	36.1
Government	21.6	19.2	18.0	20.3	19.1
Total	100.0	100.0	100.0	100.0	100.0
1979:					
Farming	13.2	6.8	16.5	12.8	8.7
Mining	4.4	25.3	.7	2.4	4.4
Construction	5.4	4.3	4.0	12.8	6.4
Manufacturing	25.0	17.9	30.5	21.4	26.2
Services	32.9	30.1	31.4	29.0	37.3
Government	19.1	15.6	16.9	19.1	17.0
Total	100.0	100.0	100.0	100.0	100.0

[1]Not adjusted for commuting and personal contributions to social insurance.
[2]Totals may not add due to rounding.

Source: (*19*).

counties with less than 20 percent of their farmland in woodlands were in the Mississippi Delta. At least 70 percent of the farmland in each of these counties was in harvested crops.

Results From Discriminant Analysis

Discriminant analysis was used to further explore the differences between SPLI counties and other nonmetro counties. Discriminant analysis is a statistical technique that helps researchers identify characteristics that combine to distinguish between two or more groups (*6*). A characteristic that appears by itself to be useful in differentiating among groups of counties may not be useful after adjusting for interactions with other characteristics. The information presented in this section is condensed. Appendix B presents a more detailed discussion of discriminant analysis.

Discriminant analysis generally supported the findings discussed earlier. The more important characteristics were percentage of income from transfer payments; percentage of the population that was elderly, nonwhite, or disabled; and percentage of the population that graduated from high school.[6] SPLI counties tended to receive a larger share of their income from transfer payments and have larger percentages of nonwhite or disabled population. The other nonmetro counties had larger percentages of elderly or high school graduates. Other variables were less effective in distinguishing between SPLI and other counties. These less important variables included percentage of earnings from farming and percentage of the population that lived in rural areas. SPLI counties were more rural and received a larger share of earnings from farming.

Economic Change

The discussion so far shows the chronically low-income SPLI group differed from nonmetro counties in general. Other original PLI counties, however, left the bottom quintile during the seventies. Examining economic data will help us understand how income growth differed among the four low-income county groups. Patterns may emerge to explain how counties escaped their low-income status.

[6]One would not expect percentage elderly to be an important distinguishing characteristic after examining table 2. For an explanation of why it was, see Appendix B.

Table 5—Selected farm characteristics of low-income and all nonmetro counties, 1978

Characteristic	Unit	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
Average farm size	Acres	283	240	242	272	508
Average harvested cropland per farm	do	76	72	85	82	151
Farmland in:						
Harvested cropland	Percent	26.9	30.1	35.1	30.0	29.8
Woodland	do	26.9	29.6	28.5	26.9	8.7
Market value of sales per farm	1,000 dollars	23.8	24.8	34.1	26.1	47.1
Farms with sales greater than $40,000	Percent	12.0	14.2	20.0	12.9	26.8
Tenure of farm operators:						
Full owners	do	66.7	66.9	63.4	63.9	56.2
Part owners	do	25.2	25.4	25.6	27.8	31.2
Tenants	do	8.1	7.8	11.0	8.3	12.6
Farm operators reporting farming as their principal occupation	do	46.3	42.0	52.9	43.8	58.6

Source: (*14*).

Per capita income grew in all groups (table 6). Per capita income by itself, however, does not tell how a particular group fared when compared with the rest of the Nation. To make such comparisons, income relatives were calculated by dividing each group's per capita personal income by that for the Nation. Each income relative expresses a group's per capita personal income as a percentage of the U.S. average.

Income Relatives

The LPLI group made the most progress in the seventies (table 6). Its income relative grew by 17.9 percentage points between 1969 and 1979, with most of the increase between 1969 and 1975. By 1979, its relative was only 9.4 percentage points less than that for all nonmetro counties.

The 1979 escapees also progressed during the seventies. The group ended the decade with a relative of 68.5, or only 13.9 points behind the nonmetro average.

The 1975 escapee group showed an unusual pattern; its relative rose between 1969 and 1975 and fell between 1975 and 1979. By 1979, its relative was only 5.2 points higher than in 1969.

Finally, the SPLI counties also improved. The group began the decade with an income relative of 48.6 percent and finished with 56.8 percent. The gap between the nonmetro and SPLI income relatives steadily narrowed during the seventies. Nevertheless, the SPLI income relative was still substantially less than those for the LPLI group or nonmetro counties in general.[7]

Earnings: Largest Source of Growth

Examining the source of growth can help explain changes in income relatives in the four low-income county groups. There are three sources of personal income growth: transfer payments, property income, and earnings.

Transfers generally provided a larger share of growth in the low-income groups than in all nonmetro counties (table 7). Transfer payments were particularly important in the SPLI group between 1969 and 1975. In that period, transfer payments provided almost a third of the group's income growth. During the second period, transfers provided 21 percent of the 1975 escapees' income growth. Retirement programs (including Social Security and Medicare), not public assistance, were the largest source (about 60 percent) of transfer payment growth between 1969 and 1979 in each low-income group.

Property provided less income growth than the nonmetro average in all the low-income groups. Earnings, however, were the largest source of income growth in all four low-income groups. About two-thirds of each group's total income growth from 1969 to 1979 came from earnings.

SPLI and LPLI Counties

Thus, changes in earnings show why the income relative improved so much more in the LPLI than in the SPLI

[7]All groups improved markedly since the fifties. In 1959, the SPLI group had an income relative of 40.5 percent, the other low-income groups had relatives between 44 and 45 percent, and nonmetro counties had a relative of 72 percent.

Table 6—Per capita personal income in low-income and all nonmetro counties

Item	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Dollars		
Per capita personal income:					
1969	1,783	2,020	2,069	1,989	2,840
1975	3,219	4,230	3,982	3,567	4,833
1979	4,971	6,394	5,395	6,000	7,220
			Percent		
Relative per capita personal income:					
1969	48.6	55.1	56.4	54.2	77.4
1975	54.9	72.2	67.9	60.9	82.5
1979	56.8	73.0	61.6	68.5	82.4

Source: (19).

group. Large changes in earnings are reflected in large changes in personal income.

Earnings Growth. Earnings per worker grew by 85 percent between 1969 and 1975 in the LPLI group (table 8). This rate was far greater than the SPLI and nonmetro rates. Earnings per worker in the group were actually higher than the nonmetro average by 1979. Mining, largely coal mining, provided about 34 percent of the group's earnings increase between 1969 and 1975 and 26.8 percent between 1975 and 1979. Mining's rapid growth changed the rank of industries within the LPLI group. When industries were ranked by share of total earnings, mining was the fourth largest LPLI sector in 1969 and the second largest sector in 1975 and 1979 (table 4). Mining was still fourth in the LPLI group when ranked by wage and salary employment in 1975 and 1979. Mining apparently pays well but employs relatively few people.

SPLI earnings per worker also grew faster than the nonmetro average in both the 1969–75 and 1975–79 periods (table 8). The growth was not enough for the SPLI counties to lose their low-income status, however. The largest sources of earnings growth were services, government, and manufacturing during the earlier period. From 1975 to 1979, the largest sources of growth were services and manufacturing followed by government and farming. Mining was a much smaller source of earnings growth in the SPLI than LPLI group.

Mining played an important role in raising the LPLI group's income, but characterizing all LPLI counties as mining counties is misleading. Mining was the largest source of earnings growth in only eight LPLI counties from 1969 to 1975 and in only six counties from 1975 to 1979 (table 9). It was the second largest source of earnings growth in an additional two counties in each period. Ten LPLI counties had mining as their largest or second largest source of earnings growth from 1969 to 1975 and/or 1975 to 1979. Kentucky had seven of these counties, Virginia two, and Alabama one. Bituminous coal was the major mineral mined. Other important sources of earnings growth in the LPLI group were services in both periods; manufacturing, especially in the second period; and government in the first period (table 8).

Demographic Differences. The LPLI and SPLI groups also differed in racial composition; percentage of the population classified as rural; population density; percentage of counties classified as retirement, college, or adjacent to an SMSA; population growth; and poverty rate (table 2). A smaller portion of the population was nonwhite or Spanish in the LPLI group. Population composition, however, varied considerably in the LPLI group. Of the 27 LPLI counties, 11 were at least 97 percent white, 5 were at least 37 percent black, and Calhoun County, SC, was about 55 percent black.

Table 7—Percentage of personal income growth from transfer payments, property income, and earnings in low-income and all nonmetro counties

Source and period	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Percent		
Transfer payments					
1969–75	32.6	23.1	26.1	29.0	23.1
1975–79	17.4	17.2	21.0	13.1	13.0
1969–79	24.1	20.1	23.8	19.2	17.5
Property income					
1969–75	11.6	10.5	11.2	13.1	15.4
1975–79	11.9	12.0	14.9	12.7	16.2
1969–79	11.8	11.2	12.9	12.9	15.9
Earnings[1]					
1969–75	55.7	66.4	62.7	58.0	61.5
1975–79	70.7	70.8	64.1	74.2	70.8
1969–79	64.1	68.6	63.3	68.0	66.6

[1]Adjusted for commuting and personal contributions to social insurance.

Source (*19*)

The LPLI group was less rural and more densely populated than the SPLI group (table 2), and no LPLI counties had fewer than 10 people per square mile. The LPLI group had about 10 more people per square mile in 1970 than the other group, which may have contributed to its economic growth. Trade and service firms in sparsely settled areas may have trouble reaching scattered households and businesses. Business expansion is easier where potential customers are closer together. Some businesses may also require a market or a specialized labor force of a minimum size before they can start.

The LPLI group also had proportionately more college counties and counties adjacent to an SMSA and fewer retirement counties than the SPLI group.

Some demographic differences may reflect the LPLI group's recent economic growth. For example, the LPLI group had higher population growth during the seventies and lower poverty rates than the SPLI group (table 2). On the other hand, poverty rates actually declined slightly more in the SPLI group since 1969.

The LPLI and SPLI groups were similar in other respects (table 2). The two group's measures of elderly, disabled, and employed populations; high school graduates; and female-headed households differed by only 2 or 3 percentage points at the most. The LPLI group's high disability rate, low educational levels, and low employment ratio, when compared with the nonmetro averages, suggest that the group has lasting social problems despite im-

Table 8—Earnings per worker and source of earnings growth by major industry in low-income and all nonmetro counties[1]

Item	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Dollars		
Earnings per worker:					
1969	3,723	4,519	3,806	3,871	5,406
1975	5,910	8,362	6,612	6,110	8,384
1979	8,791	11,873	8,588	10,136	11,627
			Percent		
Growth in earnings per worker:					
1969–75	58.7	85.0	73.7	57.8	55.1
1975–79	48.7	42.0	29.9	65.9	38.7
Source of growth in total earnings by major industry:					
1969–75—[2]					
Farming	6.6	5.5	27.8	6.2	10.5
Mining	7.7	34.0	1.0	3.1	5.6
Construction	3.9	4.4	7.5	9.8	6.2
Manufacturing	22.0	12.6	21.4	25.9	20.3
Services	35.2	25.6	24.0	33.1	36.8
Government	24.6	17.9	18.3	21.8	20.7
Total	100.0	100.0	100.0	100.0	100.0
1975–79—[2]					
Farming	14.0	7.0	-3.9	13.8	5.0
Mining	4.6	26.8	.7	2.4	5.3
Construction	6.5	3.1	-.9	18.5	6.9
Manufacturing	27.6	22.1	48.7	22.6	29.8
Services	32.2	31.6	41.4	24.9	39.5
Government	15.1	9.4	13.9	17.8	13.4
Total	100.0	100.0	100.0	100.0	100.0

[1]Not adjusted for commuting and personal contributions to social insurance.
[2]Totals may not add due to rounding.

Sources: (*18, 19*).

provements in these measures and impressive economic growth in recent years.

Disability may be particularly severe in mining counties. In 1979, Social Security Disability, Worker's Compensation, and Black Lung programs together paid $394 per capita in the five LPLI counties with mining as their largest source of growth from both 1969 to 1975 and 1975 to 1979. The same programs paid only $82 per capita in nonmetro counties as a whole. Economic growth from mining has a price: the disability rate in the five counties ranged from 14.4 to 19.3 percent compared with the 10 percent nonmetro average.

Discriminant Analysis. The discriminant analyses in Appendix B support the indications that SPLI and LPLI groups are quite similar in some demographic characteristics. The discriminant analyses show that few factors, other than economic growth from various sources, are useful in identifying PLI counties that left the bottom quintile in either the 1969–75 or 1975–79 periods. Although demographic characteristics may be useful in identifying low-income counties, they are less important in determining which counties improved their income.

The 1975 and 1979 Escapees

The SPLI and LPLI counties either left the bottom quintile in both 1975 and 1979 or remained in the bottom quintile both years. The 1975 and 1979 escapees behaved more erratically; they escaped in one year but not the other.

Changes in farm earnings largely explain the 1975 escapees' erratic behavior and their falling income relative between 1975 and 1979. Between 1969 and 1975, farming provided about 28 percent of the group's total earnings growth (table 8). Farming also was the largest source of earnings growth in 6 of the 11 counties from 1969 to 1975 (table 9). Other large sources of earnings growth during the same period were services, manufacturing, and government (table 8).

However, farm earnings in the county group fell between 1975 and 1979. Other sectors also contributed to the group's slow earnings growth between 1975 and 1979. Earnings from construction fell, and earnings from mining, services, and government grew more slowly in the 1975–79 period than in the 1969–75 period (not shown). Growth in the second period was largely concentrated in services and manufacturing (table 8).

Table 9—Number of low-income and all nonmetro counties with a particular industry as their largest source of earnings growth[1]

Period of industry	SPLI counties	LPLI counties	1975 escapees	1979 escapees	All nonmetro counties
			Number		
1969–75:					
Farming	24	3	6	3	423
Mining	19	8	0	0	125
Construction	2	1	1	1	45
Manufacturing	42	5	3	7	378
Services	115	6	1	14	1,255
Government	29	4	0	4	243
Total	231	27	11	29	2,469
1975–79:					
Farming	39	4	3	8	312
Mining	9	6	0	1	134
Construction	2	0	0	3	44
Manufacturing	69	7	3	8	612
Services	102	9	5	7	1,285
Government	10	1	0	2	82
Total	231	27	11	29	2,469

[1]Not adjusted for commuting and personal contributions to social insurance.

Source (*19*).

The relatively large number of 1979 escapees is puzzling. Why did so many counties (29) escape the bottom quintile in 1979 after failing to do so in 1975? The business cycle may provide part of the answer. The year 1975 contained a business cycle trough, while 1979 was near a business cycle peak (*17*). Although local or regional business cycles may not coincide with national business cycles, a strong national economy may have helped to pull the 1979 escapees out of the bottom quintile.

Construction, manufacturing, services, and government all provided substantial earnings growth in the 1979 escapee group (table 8). The growth of some sectors was highly concentrated in specific counties. For example, Claiborne County, MS, the construction site of a large nuclear power plant (*2*), accounted for over three-fifths of the group's gains in construction earnings between 1969 and 1979. Farming was the fifth largest source of earnings growth in both periods for the 1979 escapees (table 8). Nevertheless, farming was the largest source of earnings growth in 8 of the 29 counties from 1975 to 1979 (table 9).

A larger share of the 1979 escapees was classified as retirement counties, college counties, or adjacent to an SMSA than any other low-income group or nonmetro counties in general (table 2). Perhaps these factors contributed to the group's improved income status.

Summary and Implications

Economic and demographic characteristics varied among groups and even among counties within groups. Despite these variations, some generalizations hold true.

SPLI Counties: A Summary

The SPLI group depended heavily upon transfer payments for income. Over one-fifth of the group's income came from transfers in 1979 (table 3), and almost one-quarter of the group's personal income growth between 1969 and 1979 came from transfer payments (table 7). The group's poverty rate remained far above the nonmetro average.

Demographic characteristics also set the SPLI group apart from other nonmetro areas (table 2). Larger shares of the SPLI population were nonwhite or disabled. SPLI familes were more likely to have a female head, and smaller percentages of the SPLI population graduated from high school or worked. Over four-fifths of the SPLI population was rural.

Differences Among Low-Income Groups

Income relatives for the four low-income groups best summarize differences in income growth and escape from low-income status.

The SPLI group's income relative grew from 48.6 percent to 56.8 percent between 1969 and 1979. Personal income grew in the SPLI counties during the seventies, narrowing the income gap between the SPLI group and nonmetro counties in general. Yet, this growth was not enough to move the SPLI counties out of the bottom income quintile.

The LPLI group ended the decade with an income relative of 73 percent, or 17.9 percentage points more than in 1969, with most of the increase coming in the 1969–75 period. The LPLI group was the only low-income group where mining was a major source of growth.

The 1979 escapees' income relative grew to 68.5 percent by 1979. Construction, manufacturing, services, and government were large sources of growth. A strong national economy may also have helped the counties leave the bottom quintile in 1979.

Only the 1975 escapees' income relative grew between 1969 and 1975 and fell between 1975 and 1979. By 1979, the group's income was 61.6 percent, or only 5.2 percentage points higher than in 1969. Decreases in farm earnings between 1975 and 1979 largely explain the group's falling income relative and its return to the bottom quintile. Earnings from construction also decreased, however, and other sectors grew more slowly in the second period than in the first.

Escaping Low-Income Status

Income growth enabled 67 of the 298 original PLI counties to escape their low-income status, although the escape was only temporary for some. Leading sources of growth varied among groups and within groups; both farm and nonfarm earnings contributed to counties leaving the bottom quintile.

Farming as an Option. Some counties escaped the bottom quintile in either 1975 or 1979, helped at least in part by farm income. Farming was the largest source of earnings growth in over half of the 1975 escapees during the first period and in over one-quarter of the 1979 escapees during the second (table 9). It was also the largest source of growth in three or four LPLI counties in each period. Bad weather, poor agricultural prices, or cost increases (such as interest) could reduce farm income in these counties. Note that the 1975 escapee counties dependent on farming returned to the bottom quintile in 1979, and some of the LPLI counties and 1979 escapees may have already gone back into the bottom quintile because of falling farm income since 1979. Farm income fluctuated after 1979. U.S. net farm income was $32.3 billion in 1979, the highest since 1973, when it was $34.4 billion (*11*). In 1980, net farm income fell to $21.2 billion.

By 1981, it grew to $31 billion, fell to $22.3 billion in 1982, and fell again to $16.1 billion in 1983.

The importance of farming as a means to leave the bottom quintile should not be overstated. Only 7.5 percent of the SPLI population lived on farms in 1980. Farming alone cannot lift many counties out of the bottom quintile.

Nonfarm Industries. Most earnings growth in all the groups came from nonfarm sources. Services and manufacturing generally were major sources of nonfarm growth in all four groups in both periods. In the LPLI group, where income improved the most, the major sources of earnings growth were as follows: services in both periods; manufacturing, particularly in the second period; government in the first period; and mining in both periods.

Counties with large income increases from coal mining could fall back into the bottom quintile during a recession severe enough to affect the demand for coal. For example, a national recession, an oil glut, and energy conservation measures reduced the demand for coal in the early eighties (*8*). The unemployment rate in eastern coal mining counties reached 13.5 percent in 1982 compared with only 9.7 for the Nation. Depending on coal mining to escape the bottom quintile poses a problem other than business cycles. As discussed earlier, economic growth from mining has a price: high disability rates.

Potential for Permanent Escape. Counties need substantial growth over a long period of time to escape the bottom quintile, but unfortunately, economic growth is often erratic. For example, both the LPLI and 1975 escapee groups had much larger earnings growth rates than the nonmetro average between 1969 and 1975 (table 8). Between 1975 and 1979, however, the 1975 escapees' rate fell to 8.8 percentage points less than the nonmetro average, and the group went back into the bottom quintile. During the same period, the LPLI group's growth rate fell to only 3.3 percentage points above the nonmetro average.

A county must have ranked more than 490th from the bottom in per capita personal income to escape the bottom quintile. The median rank in 1979 for the 1979 escapees was 610, or only 120 positions above the cutoff. Of the 29 1979 escapees, 12 were within 100 positions of the cutoff. The median LPLI rank was 761 in 1979, much higher than the median 1979 escapee rank. Seven LPLI counties, however, had lower ranks in 1979 than in 1975. Six of these seven counties ranked in the 500's or low 600's in 1979. Some of the LPLI counties and 1979 escapees near the cutoff in 1979 may fall back into the bottom quintile during future recessions.

Income Growth: A Panacea?

Although most people agree that higher per capita income is desirable, it is not a panacea for all problems in low-income counties. Personal income in a county may grow rapidly but not be evenly distributed. In such a county, groups of people could remain in poverty, in spite of impressive income growth. For example, three LPLI counties had white poverty rates less than 10 percent and black poverty rates above 30 percent (*15*).

Many people in the LPLI group remained poor despite a decade of growth and high average earnings per worker. Blacks in LPLI counties had a poverty rate substantially higher than the 15.2-percent average for the total nonmetro population (table 2). Some whites also failed to benefit fully from the LPLI group's growth. The group's white poverty rate was 19.6 percent, much less than the rate for blacks in the group but more than the average nonmetro rate.

The elderly, the ill or disabled, female heads with small children, and people with little education or few jobs skills are among the people who are less likely to work and benefit directly from local earnings growth. Many low-income counties have concentrations of all of these people. Two-fifths of both the LPLI and SPLI counties simultaneously had a percentage of high school graduates less than the nonmetro average and percentages of the elderly, the disabled, and female-headed families greater than the nonmetro average.

By themselves, such counties would be hard pressed to take care of all these people simultaneously. Even counties with rapid economic growth may still need income support. National and State changes in program benefits and eligibility criteria are important to the people and economies of low-income counties.

Bibliography

(1) Beale, Calvin L. "A Further Look at Nonmetro Population Growth Since 1970," *American Journal of Agricultural Economics*, Vol. 58, No. 5 (Dec. 1976), 953–8.

(2) Crecink, John C. *Sharing in Economic Growth, The Mississippi Experience*. Agricultural Economics Research Report No. 136. Mississippi State University, Mississippi Agricultural and Forestry Experiment Station, July 1982.

(3) Davis, Thomas F. *Persistent Low-Income Counties in Nonmetro America*. RDRR-12. U.S. Dept. Agr., Econ. Stat. Coop. Ser., May 1979.

(4) Ghelfi, Linda M. "Major Public Assistance Programs: Dependency of Nonmetropolitan Counties, 1980." Paper presented at Rural Sociological Society annual meeting, San Francisco, CA, Sept. 2, 1982.

(5) Klecka, William R. "Discriminant Analysis," *SPSS: Statistical Package for the Social Sciences*, Chapter 23. New York, NY: McGraw-Hill Book Co., 1975.

(6) _____. *Discriminant Analysis*. A Sage University Paper: Quantitative Applications in the Social Sciences, No. 19. Beverly Hills and London: Sage Publications, 1980.

(7) Morrison, Donald G. "On the Interpretation of Discriminant Analysis," *Journal of Marketing Research*, Vol. VI (May 1969), 156–63.

(8) Myers, Paul R. *Regional Population and Employment Adjustments to Rising Coal Production*. RDRR-37. U.S. Dept. of Agr., Econ. Res. Serv., Nov. 1983.

(9) Ross, Peggy J., Bernal L. Green, and Robert A. Hoppe. "Classifying Major Socioeconomic Patterns Among U.S. Nonmetropolitan Counties." Paper presented at Rural Sociological Society annual meeting, Texas A&M University, Aug. 1984.

(10) Tatsuaka, Maurice M. *Discriminant Analysis: The Study of Group Differences*. Selected Topics in Advanced Statistics: An Elementary Approach, No. 6. Champaign, IL: Institute for Personality and Ability Testing, 1970.

(11) U.S. Department of Agriculture, Economic Research Service. *Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1983*. ECIFS 3-3. Sept. 1984.

(12) U.S. Department of Commerce, Bureau of the Census. *1980 Census of Population: General Social and Economic Characteristics*. Vol. 1, Chapter C, Part 26, Mississippi, PC 80-1-C26, July 1983.

(13) _____, Bureau of the Census. *Census of Population and Housing 1980: Summary Tape File 3, Technical Documentation*. 1982.

(14) _____, Bureau of the Census. Computer tapes, *Census of Agriculture*, 1969, 1974, and 1978.,

(15) _____, Bureau of the Census. Computer tapes, *Census of Population*, 1970 and 1980.

(16) _____, Bureau of the Census. "Characteristics of the Population Below the Poverty Level, 1982," *Current Population Reports*. Series P-60, No. 144, Mar. 1984.

(17) _____, Bureau of Economic Analysis. "Business Cycle Expansions and Contractions in the United States," *Business Conditions Digest*. July 1984.

(18) _____, Bureau of Economic Analysis. Computer tapes of local area employment, 1969–79.

(19) _____, Bureau of Economic Analysis. Computer tapes of local area personal income, 1959, 1969–70.

(20) _____, Bureau of Economic Analysis. *Local Area Personal Income*. Reprinted from *Local Area Personal Income, 1976–81*, Vol. 1, Aug. 1983.

(21) U.S. Executive Office of the President, Office of Management and Budget, Public Affairs. OMB-83-20. June 27, 1983.

(22) _____, Office of Management and Budget, Statistical Policy Division. *Standard Metropolitan Statistical Areas*. Revised edition, 1975.

Appendix A—Southern SPLI Counties Versus Other Southern Counties

Most of the SPLI counties are in the South, so how do southern SPLI counties compare with other southern nonmetro counties? Are the characteristics of other southern nonmetro counties similar to those for southern SPLI counties? Or are they closer to the averages for all nonmetro counties?

Appendix A answers these questions by examining differences between southern SPLI counties and other southern nonmetro counties. For brevity, comparisons are restricted to three groups:

- Southern SPLI counties;
- Other southern nonmetro counties that do not belong to any low-income groups; and
- All nonmetro counties.

This appendix examines differences in demographic and economic characteristics among the three groups. In this discussion, the phrase "other southern nonmetro counties that do not belong to any low-income groups" is abbreviated to "other southern counties."

Demographic Characteristics

Population characteristics of other southern counties are in some respects closer to those of all nonmetro counties than those of southern SPLI counties. Percentage of the population that was rural, disabled, or employed was almost identical in the other southern and all nonmetro groups (app. table 1). The rural and disabled percentages were substantially higher in the southern SPLI group than in the other two groups. Percentage employed was about 6 percentage points lower in the southern SPLI group than in the other groups.

Percentage of the population that was nonwhite or poor, and percentage of families with a female head were highest in the southern SPLI counties and lowest in all nonmetro counties (app. table 1). Other southern counties fell between the two extremes, generally closer to all nonmetro counties than to the southern SPLI counties.

A smaller portion of the population 25 years old and older graduated from high school in other southern counties than in all nonmetro counties. However, the percentage in other southern counties was closer to the nonmetro average than to the still lower southern SPLI percentage.

Other southern counties surpassed both southern SPLI and all nonmetro counties in population growth. The population grew 18.4 percent in the other southern counties, 2.6 percentage points higher than the nonmetro average and 5.1 percentage points higher than the southern SPLI average. The population density for southern counties was double the nonmetro average and substantially above that for southern SPLI counties. A larger percentage of the other southern counties was classified as retirement, college, or adjacent to an SMSA than either the southern SPLI's or all nonmetro counties.

Economic Characteristics

Some economic characteristics of other southern counties and all nonmetro counties were quite similar. Southern SPLI counties, however, were distinct from either of the other two groups.

Per Capita Income. Southern SPLI per capita income was less than per capita income in both all nonmetro and other southern groups (app. table 2). Other southern counties' per capita income was much closer to the nonmetro average than that for the southern SPLI counties each year. By 1979, per capita personal income in other southern counties reached 96 percent of the nonmetro average compared with only 69.1 percent in southern SPLI counties.

Economic Structure. Percentage of income from earnings, property income, and transfer payments were about the same in the other southern counties and all nonmetro counties in each year examined (app. table 3). Southern SPLI counties, on the other hand, received more of their income from transfers and less from property income and earnings than the other groups.

The southern SPLI counties received a smaller share of their employment and earnings from wages and more from proprietors than either of the other groups (app. table 3). Although southern SPLI counties received a particularly large share of their earnings and employment from farm proprietors, the share declined by 1979. Again, statistics for the other southern counties and for all nonmetro counties were similar each year.

Southern SPLI counties and the other two groups also differed in earnings by industry (app. table 4). Farming paid a larger percentage of earnings in southern SPLI counties than in the other groups. The percentage of earnings from farming was smallest in the other southern counties in each year. The nonmetro average was closer to the percentage for other southern counties than for southern SPLI counties, except in 1975.

Other southern counties had the largest share of earnings from manufacturing each year, followed by all nonmetro counties. Southern SPLI counties had the smallest share from manufacturing. The nonmetro average was actually closer to the percentage for southern SPLI counties than to other southern counties.

Services paid about one-third of total earnings each year in all three groups. Services paid less in the SPLI counties, however, than in the other groups. Percentage of earnings from services in the other southern counties was slightly closer to the all nonmetro percentage than to the southern SPLI percentage.

Southern SPLI counties received a slightly larger portion of their income from government than the two other groups in each year. The percentage for the other southern counties and all nonmetro counties were within 0.6 percentage point of each other each year.

Appendix table 1—Selected population characteristics of selected southern and all nonmetro counties

Item[1]	Unit	Southern SPLI counties	Other southern counties	All nonmetro counties
Counties	Number	213	827	2,469
1970 population	Thousands	2,948	19,497	54,424
1980 population	do	3,340	23,093	63,002
Population growth	Percent	13.3	18.4	15.8
Nonwhite (1980)	do	27.9	18.8	11.8
Black	do	26.5	16.7	8.7
Indian	do	1.1	.7	1.2
Other	do	.3	1.4	1.9
Spanish (1980)	do	2.1	3.3	3.3
Population per county (1980)	Number	15,681	27,924	25,517
Population per square mile (1980)	do	29.4	41.8	20.7
Rural (1980)	Percent	82.6	59.1	59.6
Disabled (1980)	do	14.5	11.2	10.0
Elderly (1980)	do	13.1	12.7	12.8
High school graduates (1980)	do	41.8	51.8	59.6
Poverty rate (1979)				
Total	do	28.5	17.4	15.2
White	do	21.9	13.1	12.5
Black	do	47.2	37.2	38.4
Female-headed families (1980)	do	14.3	12.5	10.9
Employed population (1980)	do	33.4	39.5	39.6
Counties classified as				
Retirement	do	15.4	20.3	14.6
College	do	2.3	8.0	7.2
Adjacent to SMSA	do	32.9	49.2	39.2

[1]See the glossary for definitions of terms. More detailed definitions of demographic terms, such as nonwhite, Spanish, and rural, can be found in (*13*). More detailed explanations of retirement and college counties can be found in (*1*).

Source: (*15*).

Appendix table 2—Per capita personal income in selected southern and all nonmetro counties

Year	Southern SPLI counties	Other southern counties	All nonmetro counties
		Dollars	
1969	1,786	2,619	2,840
1975	3,231	4,520	4,833
1979	4,989	6,934	7,220

Source: (*19*).

Summary for the South

Other southern counties are more like the nonmetro average in many respects than the southern SPLI counties. The nonmetro South, therefore, is made up of two groups of counties. One group contains the SPLI counties, which continue to rank near the bottom in per capita personal income. The other group contains more fortunate counties that approach the nonmetro average in per capita personal income and several demographic and economic measures.

Appendix table 3—Selected sources of personal income, employment, and earnings in selected southern and all nonmetro counties

Source	Southern SPLI counties	Other southern counties	All nonmetro counties
		Percent[1]	
Personal income:			
1969—			
Transfer payments	16.3	11.3	11.3
Property income	9.4	12.2	12.9
Earnings[2]	74.3	76.5	75.9
Total	100.0	100.0	100.0
1975—			
Transfer payments	23.9	17.1	16.6
Property income	10.4	13.4	14.0
Earnings[2]	65.7	69.5	69.4
Total	100.0	100.0	100.0
1979—			
Transfer payments	21.4	15.6	15.3
Property income	11.0	14.3	14.8
Earnings[2]	67.6	70.1	69.9
Total	100.0	100.0	100.0
Employment:			
1969—			
Wage and salary jobs	69.5	82.0	80.3
Farm proprietors	22.3	10.5	11.4
Nonfarm proprietors	8.2	7.5	8.3
Total	100.0	100.0	100.0
1975—			
Wage and salary jobs	73.3	83.6	82.3
Farm proprietors	18.3	8.7	9.5
Nonfarm proprietors	8.4	7.7	8.2
Total	100.0	100.0	100.0
1979—			
Wage and salary jobs	75.3	84.8	83.5
Farm proprietors	15.7	7.2	8.0
Nonfarm proprietors	9.0	7.9	8.6
Total	100.0	100.0	100.0
Earnings:[3]			
1969—			
Wages and salaries	70.7	78.3	76.1
Other labor income	3.7	4.5	4.3
Farm proprietors' income	13.4	7.0	8.9
Nonfarm proprietors' income	12.2	10.1	10.7
Total	100.0	100.0	100.0
1975—			
Wages and salaries	72.9	78.6	76.3
Other labor income	6.0	6.7	6.3
Farm proprietors' income	9.9	6.5	8.8
Nonfarm proprietors' income	11.2	8.1	8.5
Total	100.0	100.0	100.0
1979—			
Wages and salaries	71.7	78.5	77.0
Other labor income	7.3	8.1	7.9
Farm proprietors' income	10.7	5.7	6.9
Nonfarm proprietors' income	10.3	7.7	8.3
Total	100.0	100.0	100.0

[1]Totals may not add due to rounding.
[2]Adjusted for commuting and personal contributions to social insurance.
[3]Not adjusted for commuting and personal contributions to social insurance.
Sources: (*18, 19*).

Appendix table 4—Sources of earnings by major industry in selected southern and all nonmetro counties[1]

Year and major industry	Southern SPLI counties	Other southern counties	All nonmetro counties
		Percent[2]	
1969:			
Farming	16.9	9.0	10.9
Mining	2.0	3.7	2.7
Construction	5.2	5.9	5.9
Manufacturing	24.7	29.4	26.9
Services	32.1	34.6	35.6
Government	19.2	17.6	18.0
Total	100.0	100.0	100.0
1975:			
Farming	12.7	8.0	10.7
Mining	4.3	5.2	3.9
Construction	4.8	5.9	6.0
Manufacturing	23.9	27.0	24.2
Services	33.2	35.4	36.1
Government	21.0	18.5	19.1
Total	100.0	100.0	100.0
1979:			
Farming	13.2	7.1	8.7
Mining	4.4	5.6	4.4
Construction	5.5	6.5	6.4
Manufacturing	25.6	28.6	26.2
Services	32.7	35.8	37.3
Government	18.7	16.5	17.0
Total	100.0	100.0	100.0

[1]Not adjusted for commuting or personal contributions to social insurance.

[2]Totals may not add due to rounding.

Source: (*19*).

Appendix B—Using Discriminant Analysis to Differentiate Between Groups

Discriminate analysis was used to provide more information about the characteristics of low-income counties.[8] Discriminant analysis is a statistical technique that helps researchers examine the differences between two or more groups (*6*). The technique produces functions that identify which linear combinations of independent variables best distinguish among groups (*10*). A variable that appears by itself to differentiate between groups may not be a good discriminator after adjusting for interactions with other variables. The goal of discriminant analysis is to classify cases into groups using the independent variables. The effectiveness of the function is most clearly shown by the percentage of the cases it correctly classifies by group (*4*).

This appendix uses discriminant analysis to answer the following questions:

- Which characteristics differentiate between the original PLI counties and other nonmetro counties in 1969?
- Are the same characteristics useful in identifying SPLI counties in 1979?
- Which characteristics identify low-income counties that improved their income status?
- Do the same characteristics identify improving counties in different time periods?

Procedures

Two groups of counties were used to answer the first question: the original 298 PLI counties and all other nonmetro counties in the 48 contiguous States. The 231 SPLI counties and other nonmetro counties were used in a second analysis to see how SPLI counties differed from nonmetro counties in general.

Klecka argues that deriving and testing functions with the same cases overstates the predictive power of the classification procedure (*6*). He recommends that each case be randomly assigned to an analysis or test subgroup. The analysis subgroup is used to build the functions; the test subgroup checks the ability of the function to classify counties. Morrison, on the other hand, argues that all cases should be used when determining which variables are good discriminators (*7*). Because finding good discriminators rather than making predictions is the major focus of this appendix, all counties were used for both analysis and classification.

Two additional analyses examined low-income groups that improved during the seventies. The first function compared counties that left the low-income quintile between 1969 and 1975 (the 1975 escapees and the LPLI counties) with the remaining original PLI counties. This function showed which characteristics were associated with a county improving its income status during the early seventies. The second function compared counties that escaped the low-

[8]Ross, Green, and Hoppe also used discriminant analysis to show how various types of counties differed from other nonmetro counties (*9*). Low-income counties were one of the types they considered. Results from (*9*) are consistent with those in this appendix. However, more details for low-income counties are presented here.

income quintile between 1975 and 1979 (the 1979 escapees and the LPLI counties) with the remaining original PLI counties. This function showed which characteristics were associated with an improved income status during the late seventies.

Variables used in each function (app. table 5) were chosen after consulting the text and tables in the body of the report. Most variables are self-explanatory. "Prior," the last variable in the 1975-79 improvement function, should be explained, however. Economic change between 1969 and 1975 helps explain a county's status in 1975, but a county's status in 1979 depends on changes in both the 1969-75 and 1975-79 periods. "Prior," a dummy variable, summarizes change during the earlier period.[9] The value of "prior" is 1 for counties that escaped the bottom quintile in 1975 and 0 for counties that remained in the bottom quintile in 1975.

A southern dummy variable and percentage of families with female heads were not used in the analyses because of high correlations in the 0.7000's with other variables. The southern dummy variable was highly correlated with percentage that graduated from high school; percentage of families with a female head was highly correlated with percentage of the population that was nonwhite. Percentage of earnings and change in earnings from wages and salaries, other labor income, farm proprietors' income, and nonfarm proprietors' income also were omitted from the analyses. Some of these variables were highly correlated with other economic variables. Similarly, percentage disabled and percentage employed were omitted from the PLI and SPLI functions. Both of these variables were highly correlated with transfer payments in 1979.[10] After these adjustments, the highest correlations were in the 0.5000's and low 0.6000's for the PLI and SPLI functions and in the 0.5000's for the improvement functions.

A stepwise procedure selected variables for inclusion in each function; a variable was selected only if its contribution to discrimination between groups was significant at the 0.10 level.[11] Variables failing to enter a function may have been good discriminators alone, but in combination with other variables, their unique contributions were insufficient (*6*).

Results: PLI and SPLI Functions

Results from the PLI and SPLI functions appear in app. table 6. Group 1 consists of the 298 PLI counties in the first function and the 231 SPLI counties in the second function. In both functions, group 2 consists of the 2,144 counties that were not PLI in 1969. The 67 original PLI counties that avoided SPLI status in 1979 were excluded from the second analysis; they were not added to group 2. Thus, differences in variables that enter the first and second functions are due to economic and social changes in the original groups rather than shifting counties from one group to another.

The canonical correlation summarizes the degree of relatedness between the groups and the function and ranges from 0 (no relationship) to 1 (*6*). The functions in app. table 6 have canonical correlations of about 0.6000, indicating high relatedness. The canonical correlation squared shows the portion of variation in a function explained by the groups (*6*). The groups explain about one-third of the variation in the PLI and SPLI functions.

The group centroids are the average function value for each group. If group centroids are well separated and distinct relative to dispersion in the groups, Wilk's lambda is near zero. Higher values, up to a maximum of 1, indicate less discrimination (*6*). The lambdas in the two functions are both acceptable, in the 0.6000's. Wilk's lambda can be converted to chi-square to test for significance, and both functions are significant at the 0.001 level.

Standardized Coefficients. The coefficients for each variable are standardized: the size of a variable's coefficient shows the relative importance of the variable (*6*). For example, the most important variable in the PLI and SPLI functions is percentage of personal income from transfer payments (app. table 6). The coefficients are analogous to multiple regression coefficients (*10*). Each coefficient shows the importance of a variable after adjusting for the effects of other variables.

The signs of the standardized coefficient tell whether a variable contributes in a positive or negative direction to the value of the function (*10*). The positive direction in the PLI and SPLI functions is more descriptive of the PLI or SPLI groups because both of these groups have positive centroids. The negative direction is more descriptive of the other counties in the functions. For example, one would expect a higher portion of personal income to come from

[9]The same economic change variables for both periods cannot be used in the same function because the variables are highly correlated. For example, the simple correlation between change in mining earnings in the two periods is 0.7587 for the 298 PLI counties.

[10]Simple correlations, 1979 SPLI model: (1) Percentage of personal income from transfers with percentage disabled = 0.6905; (2) Percentage of personal income from transfers with percentage of population employed = −0.6761.

[11]The criterion for inclusion was Wilk's lambda. For more information about stepwise criteria, see (*6*) and (*5*).

Appendix table 5—Variables used in the discriminant analyses

Variable	Function			
	1969 PLI	1979 SPLI	1969-75 improvement	1975-79 improvement
Economic structure:				
Percentage of earnings from—[1]				
Farming	X	X	NA	NA
Mining	X	X	NA	NA
Construction	X	X	NA	NA
Manufacturing	X	X	NA	NA
Services	X	X	NA	NA
Government	X	X	NA	NA
Percentage of personal income from—[1]	X	X	NA	NA
Transfer payments	X	X	NA	NA
Property income	X	X	NA	NA
Per capita change in earnings from—[2, 3]				
Farming	NA	NA	X	X
Mining	NA	NA	X	X
Construction	NA	NA	X	X
Manufacturing	NA	NA	X	X
Services	NA	NA	X	X
Government	NA	NA	X	X
Per capita change in personal income from—[2, 3]				
Transfer payments	NA	NA	X	X
Property income	NA	NA	X	X
Farm structure:[4]				
Percentage of farms with sales of at least $40,000	X	X	X	X
Demographic characteristics:[5]				
Percentage nonwhite	X	X	X	X
Population per square mile	X	X	X	X
Percentage disabled	NA	NA	X	X
Percentage elderly	X	X	X	X
Percentage graduated from high school	X	X	X	X
Percentage of population employed	NA	NA	X	X
Percentage rural	X	X	X	X
Location (0, 1 dummy variables):				
Adjacent to an SMSA	X	X	X	X
Retirement county	X	X	X	X
College county	X	X	X	X
Earlier classification (0, 1 dummy variable):				
Prior[6]	NA	NA	NA	X

NA = Not applicable. Variable not used in function.
X = Used in function.

[1]The 1969 PLI function used 1969 data, and the 1979 SPLI function used 1979 data.

[2]The 1969-75 function used 1969-75 change data, and the 1975-79 function used 1975-79 change data.

[3]Per capita change in source i, 1969-75 = $\frac{X_{i,\,1975} - X_{i,\,1969}}{\text{Population, 1975}}$

Per capita change in source i, 1975-79 = $\frac{X_{i,\,1979} - X_{i,\,1975}}{\text{Population, 1979}}$

where $X_{i,\,y}$ = Earnings or personal income from source i in year y.

[4]The 1969 PLI and 1969-75 functions used 1969 Agricultural Census data. The 1975-79 function used 1974 Agricultural Census data, while the 1979 SPLI function used 1978 Agricultural Census data.

[5]The 1969 PLI and both improvement functions used 1970 Census of Population data. The 1979 SPLI function used 1980 Census of Population data.

[6]Prior = 0 if a county was in the bottom quintile in 1975. Prior = 1 if it was not. In other words, prior = 1 for LPLI counties and 1975 escapees, and prior = 0 for SPLI counties and 1979 escapees.

transfers in low-income counties than in other counties. Percentage of personal income from transfer payments and the group 1 centroids, therefore, both have positive signs (app. table 6).

Some variables entered both functions (app. table 6). One can conclude that low-income counties tended to depend more on farm earnings and transfers in both 1969 and 1979. In both functions, low-income counties tended to have more farms with small sales, a larger percentage nonwhite population, a smaller percentage elderly, a smaller percentage that graduated from high school, and a larger percentage rural population. Earnings from farming had a comparatively large or important coefficient in 1969, but by 1979, it had one of the least important coefficients. Other variables, including transfers, percentage nonwhite, percentage of elderly, and percentage that graduated from high school, were relatively important in both functions. When compared with other variables, percentage of large farms had fairly low coefficients in both functions.

The signs on most of these variables were as expected from data in the body of the report. The exception was percentage elderly, which had a negative sign, even though the SPLI group had a slightly larger percentage elderly in table 2 than all nonmetro counties. The sign on percentage elderly, however, is correct. Because the statistics in table 2 were calculated after aggregating all the counties in a group, they are essentially weighted averages. Discriminant analysis, on the other hand, gives each county equal weight. The unweighted average percentage elderly was lower in PLI and SPLI counties than in other nonmetro counties. The negative sign on the elderly coefficient does not mean that the elderly are unimportant in low-income areas but that percentage elderly is a better indicator of other nonmetro counties.

Percentage of earnings from manufacturing and percentage of personal income from property entered the PLI function but not the SPLI function. The coefficients for both of these variables were small when compared with other coefficients in the function. One might expect a negative sign on manufacturing because a larger share of earnings came from manufacturing in all nonmetro counties than in SPLI counties in all years (table 4). The unweighted percentage of earnings from manufacturing, however, was slightly higher in SPLI and PLI counties than in other nonmetro counties.

Population density, adjacency to an SMSA, and retirement county status entered the SPLI function after failing to enter the PLI function. These were minor discriminators with coefficients only in the 0.1000's at the most. A positive sign was expected on population density, since the SPLI group had 25.7 people per square mile compared with only 20.7 for all nonmetro counties (table 2). The unweighted population density, excluding Alaska and Hawaii, was only 29.9 people in SPLI counties and 43.3 in other nonmetro counties. This is consistent with the negative sign in app. table 6.

The retirement county variable is more closely associated with other nonmetro counties, although a larger percentage of SPLI counties were retirement counties. This suggests that retirees do make a contribution to local economies after adjusting for the effects of other variables.

Percentage disabled and percentage employed were omitted, as explained earlier, because of high correlations with percentage of income from transfer payments. A second set of PLI and SPLI functions was derived by substituting percentage disabled and percentage employed for the transfer variable. The new functions yielded results similar to those in app. table 6. Both of the new variables entered the PLI and SPLI functions with the expected signs. Percentage employed was the largest coefficient in the PLI function, and percentage disabled was the largest coefficient in the SPLI function.

The Classification Test. The ultimate test of a discriminant function is how well it classifies cases. Although both functions correctly classified about 87 percent of all cases (app. table 6), some cases may have been correctly classified by chance. Tau shows how much a function improves over chance (6). Both functions produced 74 percent fewer errors than expected from chance. However, the functions did a much better job of picking low-income counties than other nonmetro counties.

Results: Improvement Functions

Results from the improvement functions appear in app. table 7. Group 1 in both functions consists of PLI counties that remained in the low-income quintile, while group 2 consists of counties that escaped the bottom quintile. Thus, the SPLI counties and the 1979 escapees made up group 1 in the 1969–75 function; LPLI counties and 1975 escapees made up group 2. In the 1975–79 function, the SPLI counties and 1975 escapees made up group 1, while the LPLI counties and 1979 escapees made up group 2.

Association between the groups and the discriminant functions was slightly higher than in the PLI and SPLI functions (app. tables 6 and 7). Canonical correlations reached the 0.6000's compared with the high 0.5000's in the earlier functions. The groups in the improvement functions explained between one-third and one-half of the variation

Appendix table 6—PLI and SPLI counties versus other nonmetro counties

Item	1969 PLI	1979 SPLI
Canonical correlation	0.59875	0.57077
Squared	.35850	.32578
Wilk's lambda	.64150	.67422
Chi-square (d.f.)	1,081.20(9)	933.46(10)
Significance	.001	.001
Group centroids:[1]		
Group 1 (low-income counties)	2.00434	2.11682
Group 2 (other nonmetro counties)	-.27859	-.22807
Standardized coefficients:		
Economic structure—[2]		
Percentage of earnings from:		
Farming	.42178	.15320
Mining	**	**
Construction	**	**
Manufacturing	.10307	**
Services	**	**
Government	**	**
Percentage of personal income from:		
Transfer payments	.79226	.65545
Property income	-.20688	**
Farm structure—[3]		
Percentage of farms with sales of at least $40,000	-.12332	-.09104
Demographic characteristics—[4]		
Percentage nonwhite	.41183	.30676
Population per square mile	**	-.10378
Percentage elderly	-.35033	-.40439
Percentage graduated from high school	-.23475	-.36924
Percentage rural	.10126	.21394
Location (0, 1 dummy variables):		
Adjacent to an SMSA	**	-.09017
Retirement county	**	-.09134
College county	**	**
Percentage of classes correctly classified[1]	87.1	87.0
Group 1 (low-income counties)	91.6	95.2
Group 2 (other nonmetro counties)	86.5	86.1
Tau	74.3	74.1

** = Variable did not meet minimum criteria for inclusion in function.

[1]Group 1 is the PLI group in the 1969 PLI function and the SPLI group in the 1979 SPLI function.

[2]The 1969 PLI function used 1969 data, and the 1979 SPLI function used 1979 data.

[3]The 1969 PLI function used 1969 Agricultural Census data, and the 1979 SPLI function used 1978 Agricultural Census data.

[4]The 1969 PLI function used 1970 Census of Population data, and the 1979 SPLI function used 1980 Census of Population data.

Appendix table 7—Improvement functions

Item	1969–75 improvement	1975–79 improvement
Canonical correlation	0.60283	0.68812
Squared	.36340	.47351
Wilk's lambda	.63659	.52649
Chi-square (d.f.)	131.65(9)	186.68(10)
Significance	.001	.001
Group centroids:[1]		
Group 1 (remained in bottom quintile)	-.28788	-.45467
Group 2 (left bottom quintile)	1.96968	1.96482
Standardized coefficients:		
Economic structure—[2]		
Per capita change in earnings from:		
Farming	.62121	.46042
Mining	.64282	.22940
Construction	.36514	**
Manufacturing	.32490	.20311
Services	**	.31574
Government	.24887	.29041
Per capita change in personal income from:		
Transfer payments	.37241	**
Property income	.40118	.36904
Farm structure—[3]		
Percentage of farms with sales of least at $40,000	**	**
Demographic characteristics—[4]		
Percentage nonwhite	**	**
Population per square mile	**	**
Percentage disabled	**	.28044
Percentage elderly	**	**
Percentage graduated from high school	**	**
Percentage of population employed	**	.26306
Percentage rural	-.32161	**
Location (0,1 dummy variables):		
Adjacent to an SMSA	**	.24115
Retirement county	-.28087	**
College county	**	**
Earlier classification (0,1 dummy variable):		
Prior[5]	NA	.77458
Percentage of cases correctly classified:[1]	88.9	88.3
Group 1 (remained in bottom quintile)	90.4	91.7
Group 2 (left bottom quintile)	78.9	73.2
Tau	77.9	76.5

** = Variable did not meet minimum criteria for inclusion.
NA = Not applicable. Variable not used in this analysis.

[1]Group 1 consists of SPLI counties and 1979 escapees in the 1969–75 function and SPLI counties and 1975 escapees in the 1975–79 function. Group 2 is made up of LPLI counties and 1975 escapees in the 1969–75 function and LPLI counties and 1979 escapees in the 1975–79 function.

[2]The 1969–75 function used 1969–75 change data, and the 1975–79 function used 1975–79 change data.

[3]The 1969–75 function used 1969 Agricultural Census data, and the 1975–79 function used 1974 Agricultural Census data.

[4]Both functions used 1970 Census of Population data.

[5]Prior = 0 if a county was in the bottom quintile in 1975. Prior = 1 if it was not. In other words, prior = 1 for LPLI counties and 1975 escapees, and prior = 0 for SPLI counties and 1979 escapees.

in the discriminant functions. (See the canonical correlation squared.)

The improvement functions correctly classified about 90 percent of the observations. According to tau, they improved over random assignment by more than 75 percent. The functions classified group 1 counties more successfully than group 2 counties.

Standardized Coefficients, 1969–75. Change in earnings from mining and farming had the highest coefficients in the 1969–75 function (app. table 7). This is hardly surprising, given the growth in earnings from mining in the LPLI counties and the growth from farming in the 1975 escapees (table 9). Most of the other economic variables entered the function, all with positive signs and all but one with relatively large coefficients in the 0.3000's or 0.4000's.

Counties remaining in the bottom quintile tended to be more rural (app. table 7). No other demographic variables entered the 1969–75 function.

The negative coefficient for retirement county status may simply reflect a greater concentration of these counties in group 1. Approximately 16.9 percent of the group 1 counties were also retirement counties compared with only 7.9 percent of group 2 counties. Thus, retirement county status is more closely associated with group 1 than 2.

Standardized Coefficients, 1975–79. Prior had the most important coefficient in the 1975–79 function (0.77458), followed by change in earnings from farming (0.46042). In other words, many counties escaping the bottom quintile during the second period also escaped during the first period. The only other variables with coefficients as high as the 0.3000's were growth in property income and growth in earnings from services.

Only two demographic variables, percentage disabled and percentage employed, entered the 1975–79 function. The positive sign on percentage disabled was somewhat surprising, since disability and improving incomes are not normally linked, at least at the individual level. Group 2 had a higher average disability rate, which is consistent with the sign in app. table 7. Coefficients in discriminant functions imply association, not necessarily causality. One interpretation of the positive disability coefficient is that group 2 improved its income status despite its higher disability rate, not because of it. Alternatively, higher disability levels could increase income from disability programs.

Adjacency to an SMSA entered the function with the anticipated sign. Both the 1979 escapee and LPLI groups had a higher proportion of adjacent counties (table 2).

Finally, one of the striking differences between the PLI or SPLI functions (app. table 6) and the improvement functions (app. table 7) is the variables selected for entry. Demographic variables frequently entered the PLI and SPLI functions. Most of the variables in the improvement functions, however, were economic. This suggests that although demographic characteristics may be useful in identifying low-income counties, they are less important in determining which counties lose their low-income status.

Conclusions

The questions posed at the beginning of this appendix can now be answered. Discriminant analysis identified which variables differentiated between the original PLI counties and other nonmetro counties in 1969. Because the same variables generally entered the SPLI function, the same characteristics distinguished low-income counties in both 1969 and 1979.

Both PLI and SPLI counties depended more on transfer payments and farming than other nonmetro counties. PLI and SPLI counties also tended to have larger percentages nonwhite, disabled, and rural. Other nonmetro counties had larger percentages of the population aged, employed, or graduated from high school, and a larger percentage of farms with sales over $40,000.

Discriminant analysis also determined which factors were associated with an improving income status in the 1969–75 and 1975–79 periods. Again, the variables entering the two functions were similar. Most of the economic change variables, but few demographic variables, entered the improvement functions.

Other Reports of Interest on Rural Issues

Characteristics of Poverty in Nonmetro Counties identifies the unique characteristics of nonmetro counties with large proportions of persons living in poverty. Knowing these characteristics can help public officials develop successful antipoverty programs. In counties with high poverty rates, families headed by women are almost three times as likely to be living at or below the poverty level as they are in counties with low poverty rates. On the other hand, property is a source of personal income at similar rates in both groups of counties. RDRR-52. July 1985. 16 pp. $1.00. Order SN: 001-019-00400-2.

Natural Resource Dependence, Rural Development, and Rural Poverty examines the influence of natural resource dependence on rural income levels and recent population growth. Rural poverty and population decline are now only weakly connected with a rural county's economic dependence on agriculture, mining, or Federal landownership. Thus, natural resource-dependent counties are not the principal targets of programs designed to relieve population decline and low-income problems in rural America. RDRR-48. July 1985. 24 pp. $1.00. Order SN: 001-019-00395-2.

Rural Governments: Raising Revenues and Feeling the Pressure assesses fiscal pressures on local governments by looking at locally raised taxes and user fees as a percentage of local income. Some local governments in nonmetro areas—especially those in the rural West and in highly rural areas—experienced severe fiscal stress during the 1970's associated with high and rising local taxes. These local governments may be forced to cut back their rural development activities in the 1980's. RDRR-51. July 1985. 40 pp. $1.50. Order SN: 001-019-00399-5.

Physicians In Nonmetro Areas During the Seventies shows that the gap between the number of physicians in nonmetro and metro areas widened during the seventies, with nonmetro areas lagging by almost 100 physicians per 100,000 population. Describes availability of physicians in nonmetro areas in light of population changes and demand for medical care. RDRR-46. March 1985. 28 pp. $1.50. Order SN: 001-019-00380-4.

Do Bank Size and Metro-Nonmetro Location Affect Bank Behavior? finds that a bank's lending policies and aggressiveness in attracting large deposits depend more on the size of the bank's assets than on its location. Many rural banks do take fewer risks than urban banks, but that's because of the small sizes (values of assets) of many rural banks, not their locations. The kinds of deposits (6-month money market certificates and large time deposits) and investments (government securities and Federal funds) a bank uses, the rate of loan losses, and its profitability indicate a bank's aggressiveness and lending policies. RDRR-47. April 1985. 20 pp. $1.00. Order SN: 001-019-00392-8.

Distribution of Employment Growth in Nine Kentucky Counties: A Case Study shows that people moving to a nonmetro area held a disproportionate share of jobs in growing business establishments and of better paying executive jobs. Manufacturing was the study area's major economic driving force, but the private service sector (which provided services to the manufacturing sector and to the area's growing population) was an important contributor to job growth between 1974 and 1979. RDRR-41. August 1984. 44 pp. $2.25. Order SN: 001-019-00337-5.

Counting Hired Farmworkers: Some Points To Consider concludes that as many as two-thirds of the Nation's hired farmworkers may not have been counted in the 1980 Decennial Census farm labor categories because they were not working on farms in March when the data were collected. Data from USDA's 1981 Hired Farm Working Force Survey suggest that the farm labor census data are more likely to describe workers employed in hired farmwork year round. AER-524. December 1984. 16 pp. $1.00. Order SN: 001-019-00367-7.

Patterns of Change in the Metro and Nonmetro Labor Force, 1976-82 reveals that nonmetro areas, particularly farm areas, lagged behind metro areas in employment growth during the 1976-82 period. This reversed a pattern of faster nonmetro growth occurring in the late sixties and early seventies. RDRR-44. December 1984. 28 pp. $2.00. Order SN: 001-019-00358-8.

Chartbook of Nonmetro-Metro Trends is a quick check on metro and nonmetro socioeconomic trends. It presents colorful charts, tables, maps, and text tracing differences in population, employment, income, poverty, housing, and government between nonmetro and metro America. RDRR-43. September 1984. 48 pp. $2.50. Order SN: 001-019-00351-1.

Housing of the Rural Elderly finds that the number of rural elderly households rose 16 percent between 1974 and 1979 compared with a 10-percent increase for all U.S. households, according to this study based on the 1979 Annual Housing Survey. Most of the U.S. elderly live in adequate housing, but 27 percent of the elderly renters and 18 percent of all the elderly living in the South have inadequate housing. In 1979, 15 percent of the rural elderly lived in adequate housing compared with 8 percent of the urban elderly. RDRR-42. July 1984. 20 pp. $1.50. Order SN: 001-019-00335-9.

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